wakes up, or those who obstruct progress retire. There is no question, but that the chemical department which undertakes to run its laboratory on a strict business basis, will not only give their students more and better service for the same money, but will turn out better trained men than the laboratory with less up-to-date methods.

The College of the City of New York has partly adopted the Freas System, with such satisfactory results that we have almost doubled the amount of laboratory work given to the students per afternoon. The author feels that we should go the whole way and reap the full reward in more efficient work on the part of student and instructor. Starting is the big thing, but when once started, the plan will grow by its own intrinsic merits.

For a number of years past, the summer session of Columbia University has offered a course in laboratory organization and management, where the ideas I have here discussed have been carefully criticized by the students taking the course, mostly men and women of experience along the same line in other institutions.

Further details of this scheme will appear from time to time.

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ORGANIZATION MEETING OF THE AMERICAN SECTION OF THE PROPOSED INTERNATIONAL ASTRONOMICAL UNION

At the organizing meeting of the International Research Council held in Paris in November, 1918, it was decided to establish an International Astronomical Union, to continue and extend the work formerly conducted by such international astronomical organizations as the committee of the Carte du Ciel, the International Union for Cooperation in Solar Research, and similar bodies less formally constituted which dealt with various questions relating to astronomy and its applications. The International Research Council adopted a resolution requesting the National Academy of Sciences, or the corresponding organization in each of the countries represented, to take the initiative in organizing the section to represent that country in the International Astronomical Union. The tentative plan of organization of the American Section of the Astronomical Union, as approved by the president of the National Academy of Sciences, involved the representation of the various interests concerned as given below.

Upon the call of Dr. George E. Hale, acting for the National Academy of Sciences, the organization meeting for the American Section of the proposed Astronomical Union was held in the office of the National Research Council, Washington, D. C., March 8, 1919. The delegates who had been appointed by the presidents of the respective societies, or by the government, were as follows:

National Academy of Sciences—5.

H. D. Curtis acting for W. W. Campbell, G. E. Hale, A. A. Michelson, F. R. Moulton, Frank Schlesinger.

American Astronomical Society—10.

C. G. Abbot, S. I. Bailey, E. W. Brown, E. B. Frost, A. O. Leuschner, S. A. Mitchell, W. J. Humphreys, H. N. Russell, Joel Stebbins (absent, J. F. Hayford).

American Mathematical Society—3.

Frank Morley (two others to be appointed).

American Physical Society—3.

Henry Crew (absent, J. S. Ames, Theodore Lyman).

U. S. Naval Observatory—1.

J. A. Hoogewerff, accompanied by W. S. Eichelberger, Asaph Hall, F. B. Littell.

U. S. Coast Survey—1.

William Bowie.

The meeting organized by appointing Mr. Hale as chairman and Mr. Stebbins secretary. There followed a general discussion of the present international situation of science, and it was agreed that the union should take the place of previous international bodies in astronomy.

It was voted that the organization of the section should be considered temporary until

after the proposed conference in Paris in July, 1919.

The section voted that the chair appoint a committee on committees, to act temporarily as an executive committee, which should consider the general matter of business, appoint all committees, and add six additional members to the section. Appointed: W. W. Campbell, chairman; C. G. Abbot, E. W. Brown, Frank Schlesinger, Joel Stebbins, secretary. The committee added the following to the membership of the section: W. S. Adams, R. G. Aitken, E. E. Barnard, L. A. Bauer, Benjamin Boss, W. S. Eichelberger, W. J. Hussey, V. M. Slipher.

In regard to membership of enemy nations in the union, the section voted to adopt as representing the sentiments of the meeting the declaration of the Interallied Conference on International Scientific Relations, held at the Royal Society in London on October 9 to 11, 1918.

In regard to the admission of neutral nations to the union, the section voted that it be the sense of the meeting that nations which had been neutral in the war should be admitted into the International Astronomical Union on the conclusion of peace.

Mr. Schlesinger outlined the kind of astronomical work that requires international cooperation:

1. Work too extensive to be undertaken except by international cooperation; the Carte du Ciel, for example, or the plan of selected areas.

2. Undertakings in which there is a geographical necessity for international cooperation. Variation of latitude, longitudes, variable stars, continuous observation of solar phenomena, etc.

3. Matters of convention. Uniformity of nomenclature, notation and units. Examples, unit for stellar distances (four now in use), classification of spectra, use of probable or mean error or of average deviation, notation for celestial mechanics, notation for the reduction of photographic plates, etc.

4. The avoidance of duplication. Calculations for the national almanacs and for special ephemerides, such as comets, asteroids and variable stars. Astronomical abstracts, and news of new comets, variable stars, novæ, asteroids and the like.

The section discussed the various fields in astronomy in which committees should be formed to make report at another meeting of the section, which would give instructions to the delegates to the proposed Paris conference. The following committees were authorized by the section. The executive committee later made the appointments:

Committee on the Variation of Latitude: E. B. Littell, chairman; A. O. Leuschner, Frank Schlesinger. It was voted to ask the American Section of the International Geophysical Union to appoint a similar committee to confer and make a joint recommendation on the organization and method of handling the variation of latitude.

Committee on Standards of Wave-Length: Henry Crew, chairman; H. D. Babcock, Keivin Burns, W. W. Campbell, C. E. St. John.

Committee on Solar Rotation: C. E. St. John, chairman; W. S. Adams, Frank Schlesinger.

Committee on Eclipses: S. A. Mitchell, chairman; E. E. Barnard, H. D. Curtis.

Committee on Stellar Classification: H. N. Russell, chairman; Miss Annie J. Cannon, R. H. Curtiss.

Committee on Asteroids and Comets: A. O. Leuschner, chairman; E. W. Brown, G. H. Peters.

Committee on Almanacs: W. S. Eichelberger, chairman; E. W. Brown, R. H. Tucker.

Committee on Radial Velocities: W. W. Campbell, chairman; W. S. Adams, J. S. Plaskett.

Committee on Double Stars: R. G. Aitken, chairman; Eric Doolittle, W. J. Hussey.

Committee on Notation, Units and Economy of Publication: W. J. Humphreys, chairman; E. B. Frost, A. O. Leuschner.

Committee on Meridian Astronomy: Benjamin Boss, chairman; F. B. Littell, Frank Schlesinger.

Committee on Abstracts and Bibliographies: F. E. Fowle, chairman; H. D. Curtis, G. S. Fulcher.

Committee on Research Surveys: G. E. Hale, chairman; F. R. Moulton, Harlow Shapley.

Committee on Stellar Photometry: F. H. Seares, chairman; S. I. Bailey, F. C. Jordan, J. A. Parkhurst, Joel Stebbins.

Committee on Wireless Determination of Longitude: J. A. Hoogewerff, chairman; W. W. Campbell, J. J. Carty. This committee was requested to

study the feasibility of determinations of longitude by wireless at widely distributed stations, and report on what seems to be the proper time and method for such undertakings.

Committee on Solar Radiation: C. G. Abbott was asked to prepare a report on solar radiation.

Committee on the Spectroheliograph: The Mount Wilson Solar Observatory was asked to prepare a report on work with the spectroheliograph.

Committee on Reform of the Calendar: R. T. Crawford, chairman; W. W. Campbell, Harold Jacoby.

The question of delegates to the Paris meeting was left to the executive committee with power.

It was voted that the section offer to act in astronomical matters as the agent of the Division of Physical Sciences of the National Research Council.

Various other items of organization and scientific interest were discussed by the section at the morning and afternoon sessions, and in the evening, without formal action.

Joel Stebbins,
Secretary

SCIENTIFIC EVENTS

WAR RESEARCHES AT ST. ANDREWS UNIVERSITY

The University of St. Andrews, as reported by the London *Times*, has an interesting record of scientific service during the war, notwithstanding the fact that nearly all the men students and members of the staff of military age joined the fighting forces.

One of the early difficulties encountered by the British Admiralty and War Office was the provision of the scarce and costly kinds of sugar used in bacteriological work, which before the war had been prepared in Germany. The St. Andrews Laboratory was able to provide supplies for the British and Allied governments. In some cases the raw material itself was not to be had and new synthetic methods were devised for its production. The laboratory took part in preparing novocain and the corresponding intermediates, new processes being developed which have been adopted successfully on a manufacturing scale. Other synthetic drugs were also produced.

Professor Irvine, the director of the laboratories, acted as chemical adviser to the Department of Propellant Supplies, and for two years and a half was responsible for investigations relating to the manufacture of the materials needed for making cordite. During the last eighteen months of the war the laboratory carried on researches into chemical shellfillings.

The general work of the university was restricted during the war. But, owing to the large number of women students, the courses qualifying for useful professions were kept up with the help of senior officials, who undertook additional duties, and of extra women teachers.

Without knowing what financial help will be forthcoming from the government or the Carnegie Trust, it is impossible to say anything very definite on the developments which will take place in the new conditions created by the war. The endowments of St. Andrews leave little margin for expansion. But in general the policy of the university authorities is rather to increase the facilities for higher study and research in existing departments than to dissipate energies over a wider range of subjects. The training of graduates in research methods has been a special feature of the university for many years. It is hoped to extend the research laboratories and to enable research graduates in chemistry to combine with a training based on fundamental scientific principles a better knowledge of the necessities and methods of manufacture. A start has indeed already been made in this direction.

The university has felt justified in providing a Ph.D. degree open to graduates of British, colonial and foreign universities on terms similar to those which govern graduation in German universities. Students who wish to enter the university at a later age than usual are to be encouraged by the removal of the bar which they have hitherto met with in the preliminary examinations. In pure science the way is opened to more intensive specialization in the study for honor degrees. Syste-